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REMARKS

Claims 1-33 are pending in the present application. Claims 1, 3, 4, 8, 9, 12, 14, 16, 17, 21, 22, and 26-33, and the specification have been amended to correct typographic errors, to respond to the rejections, and/or to further clarify the subject matter recited therein. No new matter is added. In view of the amendments and the following remarks, favorable reconsideration of this case is respectfully requested.

Claims 27, 29, 31 and 33 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner asserts that the term "fast-access-time" in claims 27, 29, 31 and 33 is a relative term which renders the claim indefinite. However, the term fast-access-time node is defined in the specification as one or more disks, as supported at least in unamended paragraphs 0055 and 0083 of the published application. However, in the interest of expediting prosecution, Applicants herein amend the rejected claims to delete the term fast-access-time mass storage devices and replace it with one or more disks, as supported in paragraph 0083. Therefore, it is respectfully submitted that the claims as presented are definite and allowable.

Claims 1-8, 12-21, and 25 are rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent Publication No. 2004/0153727 to Hicken et al. (hereinafter referred to as Hicken). Applicants respectfully traverse.

Claim 1 relates to a method for managing a data storage system that includes, *inter alia*, configuring a first cache to perform at least one of the operations of retrieving data from and storing data at a first range of logical addresses (LAs) in a storage device, and configuring a second cache to perform at least one of the operations of retrieving data from and storing data at

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the first range of LAs. The method of claim 1 also includes configuring one or more third caches to perform at least one of the operations of retrieving data from and storing data at a second range of LAs in the storage device, and detecting an inability of the second cache to retrieve data from or store data at the first range of LAs. The method of amended claim 1 further includes *reconfiguring at least one of the one or more third caches to perform at least one of the operations of retrieving data from and storing data at the first range of LAs in response to the inability while continuing to perform at least one of the operations of retrieving data from and storing data at the second range of LAs.*

The Examiner asserts that Hicken discloses a method for managing a data storage system (element 300 of Fig. 3; paragraph 0038, lines 4-10), as recited in claim 1. Hicken apparently discloses a cache 339 becoming the cache for LA1 at paragraph 0042, lines 7-9. Hicken apparently discloses the host computer 310 addressing storage requests which are intended for LA1, and which are originally processed by the storage controller 370-1, to a secondary cache memory 339 of the redundant storage controller 370-2, utilizing bus 320, processor 336, and the memory bus 335-1. Therefore, Hicken merely discloses using a backup secondary cache memory for loading data in storage when a primary cache memory fails.

In stark contrast, in the present invention, upon failure of a second cache, *the third cache is reconfigured.* Hicken does not disclose or suggest a third cache utilized in this manner. In order to continue performing, Hicken transfers the responsibility previously defined for element 333 to element 339. In other words, unit 370-2 performs the functions previously performed by unit 370-1 and unit 370-2. In Hicken, element 339 is secondary to element 333, and when element 333 fails, 339 is then utilized fully. Hicken does not restore redundancy, but instead appears to bring the redundancy to bear by utilizing the redundant system as the primary system

upon failure of the primary system, for instance, the failure of element 370-1. In the system according to Hicken, if element 370-2 fails after element 370-1 has failed, and before element 370-1 is repaired or replaced, *then the entire system fails.* In contrast, in the present invention, not only does the redundant system provide continuing performance in case of failure, but a second copy of the redundant copy is immediately produced and stored in a third, undamaged, cache. *Redundancy is restored by immediately reconfiguring a third cache to perform the operations of retrieving data from and/or storing data at the first range of LAs.* Therefore, not only does the present invention allow the system to continue working, but the redundand state is also immediately restored so that if there is a second failure, the machine will still continue operating.

Support for this reading of Hicken is further provided in algorithm 400 of figure 4, in which step 414 asks if a "lone storage" exists. This is "a storage controller that is not paired-off with another storage controller and is configured such that the secondary cache memory of the storage controller is functioning as a redundant cache memory for its own primary cache memory" (Hicken; para. 0051, lines 4-6). This situation may arise if a cache fails and the mechanism of redundancy is activated. In this situation, the system according to *Hicken is vulnerable to complete catastrophe if the remaining controller fails.* In the present invention, steps 416 and 418 of algorithm 400 of Hicken are both unnecessary and inconceivable since any piece of data in the cache for which the copy was destroyed on the failure of a second cache is immediately copied again to a third cache.

Hicken does not identically disclose or suggest reconfiguring a third cache to perform the operations of retrieving data from and/or storing data at the first range of LAs, and therefore claim 1 is allowable over the reference.

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Symposium on Theory of Computing, pages 654-663, May 1997 (hereinafter referred to as Karger). Applicants respectfully traverse.

The addition of Karger fails to cure the critical deficiency discussed above in regard to Hicken as applied against claims 1 and 14. Therefore, since each of claims 9-11 and 22-24 depend from one of claims 1 and 14, each of these claims is allowable for at least the same reasons as claims 1 and 14 are allowable.

CONCLUSION

In view of the remarks set forth above, this application is believed to be in condition for allowance which action is respectfully requested. However, if for any reason the Examiner should consider this application not to be in condition for allowance, the Examiner is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

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Independent claim 14 includes a feature similar to the feature discussed above in regard to claim 1, and therefore claim 14 is allowable for at least the same reasons as claim 1 is allowable.

Claims 2-8, 12, 13, 15-21, and 25 depend from one of claims 1 and 14, and therefore each of these claims is allowable for at least the same reasons as claims 1 and 14 are allowable.

Claims 26-33 are rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 6,898,666 to Henry et al. (hereinafter referred to as Henry). Applicants respectfully traverse.

Independent claims 26, 28, 30, and 32 have been amended to include a feature similar to the feature discussed above in regard to claim 1. Henry fails to disclose or suggest the feature of a further plurality of interim fast-access-time caches adapted to be configured to be assigned the respective second range of the LAs and coupled to receive data from and provide data to the one or more mass storage devices having LAs within the respective second range when any interim fast-access-time cache fails, as recited in claim 26. Therefore, claim 26 is allowable over Henry.

Independent claims 28, 30, and 32 include features similar to the feature discussed above in regard to claim 26, and therefore each of these claims is allowable for at least the same reasons as claim 26 is allowable.

Claims 27, 29, 31, and 33 depend from one of claims 26, 28, 30, and 32, and therefore each of these claims is allowable for at least the same reasons as claims 26, 28, 30, and 32 are allowable.

Claims 9-11 and 22-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hicken in view of D. Karger et al. "Consistent Hashing and Random Trees: Distributed Caching Protocols for Relieving Hot Spots on the World Wide Web," Proceedings of the 29th ACM

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